GOVERNMENT OF WESTERN AUSTRALIA

Department of **Jobs, Tourism, Science and Innovation**

Department of **Health**

Health and Medical Life Sciences Industry Strategy

October 2021

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Deputy Premier's foreward

Global demand is increasing for new health and medical technologies, pharmaceuticals and precision medical products and Western Australia can meet this demand by utilising our state's internationally recognised expertise to commercialise practical solutions to often complex health needs.

Interest in the sector has been amplified by the COVID-19 pandemic, highlighting the importance of reducing dependence on imports by building resilience and sovereign capability to secure local health and medical supply chains.

WA's health and medical life sciences sector has experienced significant growth in recent years, creating and exporting world-leading innovations that improve health outcomes for people in our state, nationally and globally.

Diversifying the state's economy is a key objective of the Western Australian Government. The state's economic development framework Diversify WA sets out the initiatives, actions and strategies that will contribute to achieving a strong and diversified economy delivering secure, quality jobs through increased investment across a broad range of industries.

In Western Australia, our strong resources sector has played a vital role in our economic success, and the importance of this sector will continue. However, the emerging health and medical life sciences sector presents an opportunity to grow a new, globally-significant and sustainable industry sector to diversify our economy and build economic resilience.

Western Australia leads the world in autonomous and remote operations, robotics and systems integration. These capabilities have been developed by the resources sector through unparalleled automation across multiple operations.

These advances are being transferred to other sectors including defence, rural and remote health delivery and patient monitoring, agriculture and advanced manufacturing applications for medical products and devices.

The Western Australian Government is strongly committed to supporting the medical technology and pharmaceutical sectors through attracting investment, growing research and development and commercialising medical products and services for the local, national and global marketplace.

The Health and Medical Life Sciences Industry Strategy, will deliver economic benefits and improved patient and general health outcomes. The strategy will build on Western Australian Government initiatives to stimulate and strengthen the industry over the next four years, and position the health and medical life sciences sector in WA as a world-leading, sustainable and value-adding industry.

I am pleased to support this collaboration between the Department of Jobs, Tourism, Science and Innovation and the Department of Health, which provides strategic focus to removing barriers to innovation, helping grow local businesses, creating and retaining highly skilled jobs and diversifying the state's economy.

Hon Roger Cook MLA
Deputy Premier; Minister for Health; Medical Research; State Development, Jobs and Trade; Science

Message from the Chief Scientist

I am delighted to support the Health and Medical Life Sciences Industry Strategy, an industry I am passionate about. The strategy will enable turning the state's many comparative advantages in the life sciences into high quality jobs, greater investment and broad community benefits.

Western Australia has a strong research base, which is the engine room for creating innovative commercial opportunities. Our five universities all have strengths in the life sciences, as do the excellent medical research institutes – Telethon Kids, Harry Perkins, Lions Eye and Perron. The very bright people in these organisations generate the ideas that become the commercial successes now, as well as into the future.

The state has been home to the development of very successful companies, which have subsequently grown nationally or internationally – Avita, iCeutica, and Sirtex to name a few. The current group of companies on the rise is extremely encouraging, with Linear Clinical Research, Ozgene, Orthocell, Suda, and Gelflex garnering successes. While emerging businesses such as OncoRes, Respirion, Artrya, and Singular Health are burgeoning rapidly.

It was uplifting to see how Western Australian companies were able to adapt during the COVID-19 pandemic and provide vital health commodities for the community. The many success stories include Wild Child Laboratories for sanitisers, Adarsh Australia for face shields, and several companies which produced prototype ventilators.

Exciting novel approaches to diagnostic tests for the COVID-19 virus have been developed within the State, with Alcolizer producing an antigen-based test, while Avicena and the Telethon Kids Institute developed a LAMP-based screening test.

Western Australia's health and medical sector uses world-leading remote operation capabilities developed in the state's resources sector and Royal Perth Hospital's Health in a Virtual Environment (HIVE) is a prime example of remote monitoring of patients.

The state has a world-class research base, entrepreneurial talent and commercialisation track record in the health and medical life sciences. For example, of the 15 Food and Drug Administration approved drugs developed nationally through the university sector, six were developed in WA and half of these were RNA therapeutics.

Our state is a biodiversity hotspot, with flora and fauna which do not exist anywhere else on the planet. The world has an urgent need for new antibiotics, cancer drugs, anti-viral compounds, some of which could be isolated from the state's biodiversity treasure trove.

What an exciting time to be working in the life sciences. Let's grasp this special moment and make the most of the opportunities in front of us.

Professor Peter Klinken AC
Chief Scientist of Western Australia

Defining health and medical life sciences

For the purposes of this strategy, the health and medical life sciences industry has been divided into five subsectors, including digital health, medical technology, biotechnology, pharmaceuticals and health and wellness. Some of these areas overlap and gains made in one subsector can have positive flow-on effects to others.

Digital health is characterised by the use of digital technologies such as smart phones, social networks, internet applications and data science to treat, diagnose, cure, mitigate and prevent disease or other conditions. Western Australia is also a global leader in autonomous and remote operations, artificial intelligence, robotics and systems integration. This enables cross-sectoral application to rural and remote health delivery and patient monitoring, and advanced manufacturing applications for medical products and devices.

Medical technology (medtech) refers to the development of medical devices and electronic products for application in healthcare. It is a broad sector, covering disposables, capital equipment, surgical procedure innovations, implant technology, biomaterials, testing and diagnostics devices. Western Australia's medtech subsector consists of many small companies at an early development stage.

Biotechnology (biotech) is technology based on living systems, organisms or processes to improve the quality of human life. Biotech can be used for a variety of applications in agriculture, industry and medicine. In medicine, biotech is used to improve diagnosis, produce and deliver drugs, vaccines and other therapies. Leveraging Western Australia's comparative advantages and capabilities in 'omics' and gene, cell and tissue therapies advances the whole biotech subsector. Western Australia is home to drug-development companies offering a new generation of RNA therapeutics that address unmet needs in treating disease.

Pharmaceuticals are compounds, peptides or biologics manufactured for use as medicines in health care. Our state has high-quality discovery research, pharmacology profiling capability and pre-clinical models in universities and research institutes, alongside a number of small pharmaceutical companies looking for funding to expand.

Western Australia has the capability to undertake globally-recognised clinical trials for large overseas pharmaceutical companies, as well as home-grown companies. Opportunities also exist for bio-prospecting and the commercialisation of the state's unique biodiversity through pharmaceuticals.

Health and wellness refers to the products or services that improve health and wellbeing, including wellness plans, cannabinoid products, commercial innovative service models and cosmeceuticals. It does not include non-scientifically validated products or services such as aromatherapy and alternative medicines. Growth in the health and wellness sector does not require progression through a complex pathway to commercialisation. Medicinal cannabis manufacturing is an area of the health and wellness sector that is seeing growth locally, nationally and globally.

Government's vision

Vision

Western Australia has a world-class health and medical life sciences industry. This sector commercialises local research and innovations – contributing to the diversification of the economy, the creation of highly skilled jobs and improved patient outcomes globally.

Objectives

Objectives	Focus areas
Enhance collaboration and coordination across the health and medical life sciences ecosystem	1. Strengthening the innovation ecosystem
Support market readiness and provide accelerated pathways for the commercialisation of health and medical life sciences products and services	2. Facilitating commercialisation
Build a critical mass of skills and expertise to develop and commercialise health and medical life sciences products and services	3. Developing skills and attracting talent
Facilitate access to investment necessary to progress health and medical life sciences innovations through to commercialisation	4. Attracting investment
Support and enhance local medtech and pharmaceutical manufacturing infrastructure and capabilities	5. Supporting infrastructure for advanced manufacturing

Approach

The government's strategy builds on industry feedback to drive the growth of the health and medical life sciences ecosystem and the commercialisation of local innovations.

The Health and Medical Life Sciences Industry Strategy will guide the Western Australian Government's efforts for strategic development of this industry by building on the state's comparative advantages. This strategy supports the state's economic development framework, Diversify WA, which identifies health and medical life sciences as a priority sector for the state.

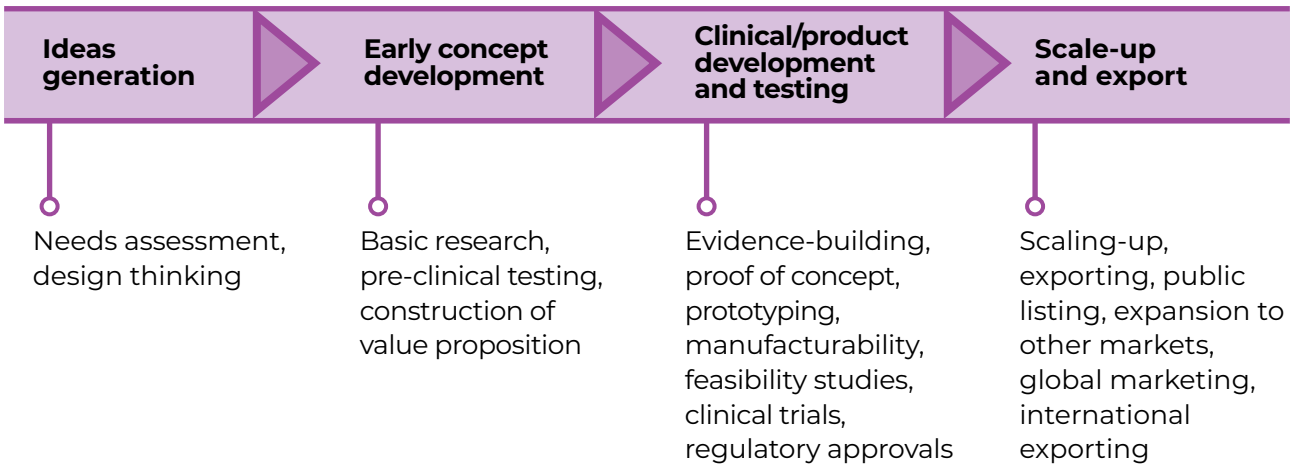
The strategy focuses on supporting the growth of an ecosystem that will support innovators, taking their ideas and research through to prototyping, scale-up and commercialisation. It considers opportunities across the breadth of the health and medical life sciences industry subsectors.

The strategy's focus areas respond to industry's concerns regarding challenges to:

- collaborate and scale-up operations in the current ecosystem
- navigate regulations to commercialise innovations, particularly regarding intellectual property, procurement and bio-prospecting
- attract and retain relevant capabilities and skills
- attract large pharmaceutical companies and other investment to support progressing local innovations along the path to commercialisation
- access infrastructure to develop and test prototypes, and manufacture products.

Commercialisation pipeline and key components

A metaphor of a 'pipeline' is often used to describe the innovation and commercialisation process, from idea generation through to scale-up and export. The diagram below shows the different stages of growth along the pipeline and the key components. This process has been simplified and displayed linearly. However, in practice it is often complex and iterative.



Why a Health and Medical Life Sciences Industry Strategy?

Western Australia stands on the cusp of exponential growth in the health and medical life sciences industry.

The state needs a dedicated strategy to reap the full potential of its world-class research, vibrant innovation ecosystem, unique environment and cross-sector manufacturing capability.

An industry of vast potential

According to AusBiotech's Life Sciences Sector Snapshot 2019, Western Australia's broader life sciences sector, which includes the health and medical life sciences industry, has experienced the fastest growth in Australia.

The number of life sciences companies in Western Australia has increased significantly in recent years. This growth mirrors global demand for pharmaceutical and medical products, which are already one of Australia's largest manufactured exports, with an estimated value of $8.4 billion in 2019.

CSIRO's Medical Technologies and Pharmaceuticals Roadmap 2017 forecast global revenue from medtech and pharmaceutical industries to reach $3.7 trillion in 2025, including $2.4 trillion for pharmaceuticals and $1.0 trillion for medtech.

The MedTech and Pharma Growth Centre (MTPConnect) anticipates that the medtech, biotech and pharmaceuticals industries could create 28,000 jobs and 200 new companies nationally by 2025.

COVID-19 and other opportunities

The COVID-19 pandemic has vastly accelerated this growth by driving global interest in medical innovations, diagnostic devices, vaccines and treatments. It has highlighted sovereign risks associated with external supply of strategic medical inputs and products, and has provided local industry with an opportunity to innovate and adapt their services.

The pandemic also reinforced opportunities for Western Australia's health and medical life sciences industry.

Companies can draw on expertise from the resources and space industries to advance remote health delivery, robotics, artificial intelligence, virtual reality and wearable device technologies.

The trends and predictions show the potential for Western Australia to play a far greater role in this sector and capitalise on the local research talent is globally recognised.

Western Australia is well-placed to seize this opportunity. It can build on its successful management of the COVID-19 pandemic to penetrate this rapidly growing global market.

Coupled with local expertise in delivering health services in remote areas, transferable technologies from the resources sector, and access to biodiversity hotspots, this capability is key to growing a competitive health and medical life sciences industry in Western Australia.

Acting now for future growth

Western Australia aims to fully realise the opportunity of this rapidly growing industry with strong leadership and support from government, which will grow the local health and medical life sciences ecosystem and facilitate accelerated pathways to commercialisation.

Local start-ups, scale-ups and small-to-medium-enterprises must be given the right support to assist in removing barriers so they can continue to grow, create jobs and importantly, stay and thrive in Western Australia.

The window of opportunity is limited in time, as global supply chains reorganise themselves on the back of the COVID-19 pandemic, and as other jurisdictions compete to capture global investment and talent.

The right time is right now.

WA CASE STUDY

COVID-19 and Western Australia's health and medical supply chains

Diversify WA: Supply Chain Development Plan identifies key actions to target the growth of industries in the health and medical life sciences sector, particularly the development and commercialisation of innovative medical products and services and opportunities for local manufacture.

During the height of the COVID-19 pandemic in Western Australia, and with support from government, a number of companies across a variety of industries rapidly adapted their services to produce hand sanitisers, personal protective equipment, testing regimes and drugs to be used in the treatment of the disease. This rapid transition to COVID-19-specific collaboration has been expanded across a broader suite of health and medical goods and services beyond the pandemic.

COVID-19 has impacted supply chains and highlighted the importance of reducing dependence on imports and building resilience and sovereign capability to secure local health and medical supplies.

Successfully securing supply chains will be reliant on industry's capacity and capability to access the relevant capital and infrastructure, technical expertise and certification for prototyping and manufacturing. This will enable collaboration and cross-sector engagement to establish effective business–government relationships.

Opportunity exists for government and private investors to help diversify the Western Australian economy in a way that is meaningful, sustainable and valuable to our community.

Delivering a whole-of-government approach

The Department of Jobs, Tourism, Science and Innovation, in collaboration with the Department of Health, has led the development of the Western Australia's Health and Medical Life Sciences Industry Strategy.

This strategy provides a strategic framework with a consistent, clear and coordinated approach that can be implemented with industry, to build on the state's current and future comparative advantages and overcome barriers to growth and increased commercialisation.

All government agencies and external stakeholders must work toward a common vision, in line with the Western Australian Government's broader economic development agenda. This alignment enables the state to focus resources, facilitate delivery, and secure opportunities with other industries targeted by Government, such as automation and remote services, advanced manufacturing, data science and cybersecurity.

The strategy also provides a robust basis for working with the Australian Government to grow the industry by leveraging support through targeted programs and initiatives, such as the Modern Manufacturing Strategy.

The benefits are broad and numerous

Local success in the life sciences industry drives jobs creation, economic growth and increased investment, while it also improves the health and wellbeing of the global community.

This success will also support the resilience of the state's economy by growing a sector that has emerged as one of the world's 'recession-proof' economies as it rapidly, and

WA CASE STUDY

The Zenith endograft – Invented in Perth, now a global success story manufactured in Queensland

Thousands of patients' lives have been saved around the world because of an invention from Western Australia.

Professor Michael Laurence-Brown and Mr David Hartley invented the Zenith endograft to repair abdominal aortic aneurysms under radiological guidance while working at Royal Perth Hospital in the 1990s.

This technology has since been licensed to an out-of-state company which manufactures and exports the stents to global clients, which highlights the risk of lost IP, talent, jobs and growth for the State.

This valuable lesson in lost opportunity underscores the imperative for the implementation of this strategy to enable local companies to stay and grow in Western Australia.

Image credit: WA Health

exponentially, outperforms other sectors. It will reduce the sovereign risk of health and medical supply chains being compromised, and contribute to a safer, better future.

A global network

WA's network of global investment and trade offices provide support and information for worldwide investors and buyers.

The State's close proximity to major markets and outstanding international connectivity result in an economy that is export-orientated – with around half of Australia's exports of goods originating from WA each year. WA also has timezone proximity with more than half of the world's populations, and its counter-geographic location to Europe and North America enables work to continue across time zones for 24 hours if required.

Existing state initiatives that support the growth of the health and medical life sciences industry include:

Western Australia health initiatives

- WA Sustainable Health Review 2019
- WA Future Health Research and Innovation Fund Strategy 2020–2022
- Precision Health in Western Australia Inaugural report from the Minister for Health's Precision Health Council 2020
- Royal Perth Hospital Synapse 74
- Health in a Virtual Environment (HIVE)
- Medical Research Institutes, including
  - Telethon Kids Institute
  - Harry Perkins Institute of Medical Research
  - Perron Institute for Neurological and Translational Science
  - Lions Eye Institute
- WA Health Translation Network (WAHTN)

Image credit: WA Health

Western Australia's industry policy and funding frameworks

- The New Industries Fund
- Western Australian Science and Innovation Framework 2018–2022
- Diversify WA
- Diversify WA: Supply Chain Development Plan 2021-22
- MTPConnect WA Life Sciences Innovation Hub (WALSIH) (supported by the New Industries Fund - UWA-MTPConnect)
- Investment Attraction and New Industries Fund
- COVID Industry Support Fund
- Local Capability Fund (LCF) is to assist small and medium enterprises (SMEs) in Western Australia to increase their capability and competitiveness as suppliers of products, services and works to the Western Australian State Government, major projects and other important markets.
- State STEM Skills Strategy 'Future Jobs, Future Skills – Driving STEM Skills in Western Australia'.

Western Australia's comparative advantages

Western Australia's unique comparative advantages in the health and medical life sciences industry are key to attracting capital and talent in an increasingly competitive global environment.

Strong research base

Western Australia has an internationally recognised research base and significant entrepreneurial talent in health and medical sciences, achieving both scientific excellence and commercial success.

Researchers, experienced clinicians, entrepreneurs and innovators who have the expertise and ability to contribute to the growth and competitiveness of the industry are already here in Western Australia. Their expertise extends to niche and specialised technologies, such as rare diseases and 'omics' technologies.

The state's substantial expertise in this industry is underpinned by outstanding research infrastructure, including five universities, three medical schools,

Highlights

» Nobel Laureates and Western Australian clinicians Professor Barry Marshall and Dr Robin Warren discovered the role of the *Helicobacter pylori* bacterium in causing stomach ulcers, which resulted in the formation of the company Tri Med.

» A team of Western Australian researchers, led by Professors Steve Wilton and Sue Fletcher, has pioneered a US Food and Drug Administration (FDA) approved personalised treatment for Duchenne muscular dystrophy. This therapeutic platform has the potential to be used in treating diabetes, asthma, coronary heart disease and Alzheimer's, and to even induce host resistance to COVID-19 infection.

» iCeutica created new branded medicines using its proprietary SoluMatrix™ Fine Particle Technology, invented in Western Australia. Three products using the technology have been approved by the FDA and launched in the USA.

» Health in a Virtual Environment (HIVE) is Western Australia's first in-patient remote monitoring service, providing continuous monitoring of vulnerable patients in selected hospitals through an artificial intelligence platform and a two-way audio-visual system linking HIVE clinicians with staff on the ward.

» MTPConnect WA Life Sciences Innovation Hub focuses on developing medtech, biotech and pharmaceuticals to grow Western Australia's life sciences sector, create jobs and expand opportunities for greater access to international markets

» The Royal Perth Hospital Synapse 74, a health and medical innovation hub funded by the Western Australian Government, will provide an environment for closer interaction between clinicians, patients, innovators and innovation funders.

» Western Australia is home to Avicena Systems, a medtech company that is designing and manufacturing the world's first low-cost, ultra-high throughput robotic LAMP-based screening system for COVID-19.

multiple medical research institutes and one of the largest medical precinct in the Southern Hemisphere.

Western Australia is home to the Queen Elizabeth II Medical Centre (QEII), and new technologically advanced hospitals, including recently commissioned facilities such as Fiona Stanley Hospital and Perth Children's Hospital.

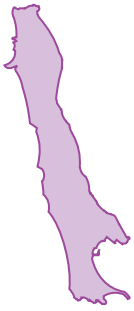
The Western Australian Government has committed $1.8 billion toward the construction of a new world-class Women and Babies Hospital.

Western Australia also hosts strong data science infrastructure and high-performance computing, including the Pawsey Supercomputer and DownUnder GeoSolutions, which provides high-performance computing as a service.

Vibrant health and medical innovation ecosystem

Western Australia has a rapidly growing and very active health and medical innovation ecosystem, comprising a mix of private businesses, universities, public hospitals and non-governmental organisations.

In 2019 there were more than 41 biotech and pharmaceutical companies and 53 medtech and digital health companies based in Western Australia, along with 22 research institutions and 63 services and support organisations. Since 2020, and especially as a result of the impact of



Northern corridor
Edith Cowan University, Joondalup Heath Campus, Telethon Kids Institute presence and new ORIGINS Project.

Western corridor
QEII Campus, The University of Western Australia, Telethon Kids Institute, Linear Clinical Research, new Perth Children's Hospital, Harry Perkins Institute of Medical Research and the Western Australian Health Translation Network headquarters.

Central Business District
Royal Perth Hospital, Synapse 74, university presence, Medical Research Foundation and innovation collaboration spaces.

Perth

Fremantle

Eastern corridor
Curtin University Bentley, new Midland Hospital Campus, ChemCentre and new biobanking centre.

Southern corridor
Murdoch University Health Precinct including the new Australian National Phenome Centre, Fiona Stanley Hospital, State Agricultural Biotechnology Centre, Harry Perkins Institute of Medical Research South, and the Animal Resource Centre.

Rockingham

COVID-19, significant numbers of local companies and institutions have expanded their staff levels to accommodate rapidly growing demand.

Global growth forecasts already show an extremely promising future ahead for these organisations. All it will take is visionaries, both from government and private investors, to take a risk and back our existing local enterprises.

Most of these entities are located in multiple clusters across the metropolitan area, including the MTPConnect WA Life Sciences Innovation Hub, based at the Harry Perkins Institute of Medical Research, where facilities and IP (intellectual property) protection services support active collaboration and innovation.

Unique natural environment

Western Australia's unique natural environment has shaped local expertise and know-how and is a key comparative advantage to developing niche health and medical life science products.

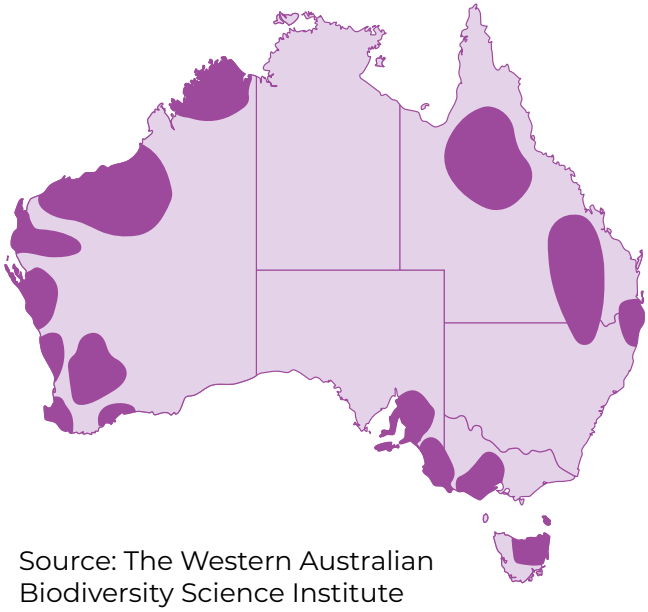
In particular, the vast distances in the state's regional and remote areas have spurred advances and innovations in telemedicine, which are supported by world-leading expertise in remote mining operations.

The wealth of natural genetic material found in the state's eight biodiversity hotspots and their potential commercial applications present bio-prospecting opportunities for researchers and industry practitioners to identify characteristics in native flora and fauna that could have commercial applications in health.

An attractive place to live and do business

Perth is consistently ranked as one of the world's most liveable cities, due to the high quality of education, infrastructure and health care, pristine surroundings

Australia's 15 biodiversity hotspots



Source: The Western Australian Biodiversity Science Institute

and a favourable climate. There is a vibrant and high-performing local economy, with a high proportion of ASX-listed companies and operational bases for large multinationals.

In the current climate, Western Australia is an increasingly attractive destination for returning talent, who are drawn to the safety, security and strong economy of their home state.

Western Australia has the competitive advantage of close geographic and timezone proximity to more than half of the world's populations. When coupled with the state's abundant resources, highly sought-after world class industries and internationally-renowned research and education institutions, Western Australia is a highly attractive business destination.

Highlights

» Of the 15 drugs developed through the Australian university sector that have achieved US Food and Drug Administration (FDA) approval, six are from Western Australia. Achieving FDA approval is a difficult process and provides a launch pad to the global market.

» Epichem, based in Western Australia, is Australia's only commercial chemistry company for drug discovery, drug development, drug design and pharmaceutical reference standard production and manufacture. Established 17 years ago, the company exports 80% of its products and services to the USA and Europe and is recognised in the top 10 small-to-medium-size enterprise employers of PhD graduates in Australia.

» A growing pipeline of promising early-stage companies includes:

› development by OncoRes of a handheld imaging tool and console to help surgeons better identify and remove all cancerous breast tissue in the first surgery

› Artrya's AI solution which increases the accuracy of identifying patients at risk of coronary artery disease, resulting in faster, better treatment.

Epichem – Epichem Synthetic Organic Chemists, Dr Roger Derbyshire and Dr Rafiqual Islam, chat about precision weighing for compounds at the balances in the Robert Stick Laboratory

OncoRes Medical – OncoRes Board and Management Team March 2020: Back (L – R) Anthony Fortina, Kath Giles, Leslie Wise, Simon Graindorge, Robert Pass, Sofie de Wolf, Stuart Bartlett. Front (L – R) Georgina Holbeche, Jill Anderson, Stephen Thompson. Photo by Rob Johnson.

Artrya – John Barrington AM, Managing Director, Co-Founder and John Konstantopoulos, Executive Director – Product, Co-Founder.

WA CASE STUDY

Dimerix Limited – Western Australian innovation expanding beyond our borders

Dimerix is a clinical-stage biopharmaceutical company, with multiple Phase 3 opportunities, developing and commercialising pharmaceutical products for global markets.

Dimerix pursues new product concepts and applies strong scientific know-how to the discovery of products from early-stage development through to commercialisation. The company has discovered a treatment that has potential utility in the treatment of patients with kidney disease and with COVID-19 respiratory complications.

Dimerix has completed multiple Phase 2 clinical trials of DMX-200, a chemokine receptor blocker and is currently in three different Phase 3 clinical studies in inflammatory diseases, as well as developing other longer-term propositions. Importantly, the company is fully funded for those current activities. Dimerix continues to assess other potential opportunities that fit with the company strategy.

Dimerix was originally founded in 2004, based on technology developed at the Harry Perkins Institute of Medical Research and The University of Western Australia.

Though the company's headquarters and staff are now in Melbourne, Western Australia still benefits from its operations through links back to the State, both in terms of financial returns, as well as capability and capacity-building.

Supporting local companies to scale and creating an environment that enables local talent to stay longer and grow their businesses in Western Australia, will support local jobs and benefit the economy.

Dimerix is currently engaged in three different Phase 3 clinical trials

WA CASE STUDY

PYC Therapeutics – A new generation of RNA therapeutics

RNA therapeutics have come of age, with an expanding landscape of pre-clinical, clinical and commercial validation across many modalities.

The heightened awareness of mRNA vaccines – or "messenger" RNA vaccines that teach cells how to make a protein that triggers an immune response – to protect against COVID-19, is bringing greater attention to the work of Perth-based PYC Therapeutics.

PYC is building a pipeline of highly-precise RNA therapeutics, leveraging the latest generation in Antisense Oligonucleotides called Phosphorodiamidate Morpholino Oligomers (PMOs). The PMOs enable a safer and more effective RNA therapeutic to address the underlying drivers of a range of genetic diseases for which currently there is no treatment.

PYC's market capitalisation has jumped five-fold in the last few years, to well over $400 million, with much of the success driven by Perth's Professor Sue Fletcher, a medical researcher and respected RNA therapeutics pioneer.

Professor Fletcher and colleague Professor Steve Wilton created a world-first treatment for a fatal childhood muscle-wasting disease, Duchenne muscular dystrophy, which in 2016 received accelerated approval by the US Food and Drug Administration.

"If you think of the gene as being the hardware and the RNA as being the software, we're modifying the software that provides the instructions for building proteins and cell components," Prof Fletcher explained.

PYC, a "precision medicine" company, is initially using its technology to treat two rare inherited eye diseases that cause progressive vision loss – retinitis pigmentosa type 11 and autosomal dominant optic atrophy – but plans to eventually apply it to the central nervous system.

PYC's discovery and laboratory operations are located at the Harry Perkins Institute of Medical Research, and the company's preclinical, clinical, regulatory and corporate operations are based in the US to better reach partners and investors in the well-established American life sciences market.

Left to right Professor Sue Fletcher, Dr Adam Martins, Chris McFarlane

WA CASE STUDY

The Australian National Phenome Centre

The Australian National Phenome Centre (ANPC), located at Murdoch University's Health and Knowledge Precinct, is the international centre of expertise in metabolic phenotyping and one of the most significant health research collaborations realised in Western Australia.

Led by Murdoch University and housed in the Harry Perkins Institute (South), the ANPC is a powerful resource for researchers, enabling them to examine the complex interaction and influence of genes, the environment and lifestyle on human and animal health.

Research at the ANPC is connected with work at similar centres across the International Phenome Centre Network, including sites in London, Birmingham, Hong Kong and Singapore, supported by Bruker Biospin and Bruker Daltonics. This collaboration will progress the global understanding of the effects of diverse environmental and cultural conditions on a range of serious diseases and conditions including type 2 diabetes, cancer and autism. The ANPC is also leading a global initiative to phenotype COVID-19 samples and is collaborating with international researchers from Cambridge University, Massachusetts General Hospital for Children, CIC bioGUNE, Spain and UNIMAS, Malaysia to better understand the disease.

The work of the ANPC supports almost every area of bioscience. Its sophisticated biological analysis technology will transform and optimise disease prevention, diagnosis, and personalised health. It reaches across traditional research silos and fosters a new, more collaborative approach to science that is critical to solving some of the world's most challenging problems, including chronic diseases and the many health issues associated with population ageing.

Supported by the Western Australian Government and the Australian Research Council, the ANPC is a core platform of the Western Australian Health Translation Network (WAHTN) and plays a key role in realising the vision of the government's Sustainable Health Review – to position Western Australia's health system for the future.

Australian National Phenome Centre, Murdoch

Government focus areas

The strategy outlines five focus areas that address the challenges facing the life sciences industry in Western Australia, and frames the implementation of a growth plan, which has been designed in consultation with industry.

1. Strengthening the innovation ecosystem

The Western Australian Government will build on the MTPConnect WA Life Sciences Innovation Hub to facilitate active collaboration and the growth of a healthy innovation ecosystem.

A healthy innovation ecosystem is key to supporting the growth of the health and medical life sciences industry in Western Australia, and to keep businesses in the State for longer as they scale up to fully realise their commercial potential. The growth of a vibrant health and medical life sciences ecosystem around the MTPConnect WA Life Sciences Innovation Hub requires long-term government support in the form of promotional and facilitation activities, targeted incentives, active partnership, and regulation that supports data sharing.

Government will focus on:

» providing the strategic support required to enhance coordination and collaboration

» supporting and promoting the MTPConnect WA Life Sciences Innovation Hub as a central point of facilitation and advice

» expanding networks and collaboration across the industry

» expanding access to data and the ability to share data.

WA CASE STUDY

Baxter and Pure IV

There is developing capability and emerging opportunities to leverage the high-quality infrastructure of large world-class companies based in Western Australia.

The PureIV production team within one of the aseptic suites while compounding is taking place

In November 2020, a $290 million Department of Health contract was awarded to Baxter Healthcare and local Western Australian company Pure IV to manufacture specially prepared medication and supplies across the Western Australian health system. Baxter's Canning Vale facility has capability to produce more than 200,000 units of critical medical products and Pure IV combines a purpose-built manufacturing and pharmacy facility in Shenton Park that enables dispensing and supply direct to patients.

The contract replaces various separate agreements between pharmaceutical companies and individual hospitals and will save the Western Australian health system up to $35 million over the next 10 years, as well as supporting local manufacturing and jobs in the Perth metropolitan area.

WA CASE STUDY

Orthocell – One of Western Australia's many emerging companies leveraging Government support to attract investment and grow internationally

An example of Western Australia's future, Orthocell provides hope for people with quadriplegia by enhancing the surgical repair of damaged nerves with their CelGro collagen medical device. The company's technology has assisted in returning function to previously paralysed arms and hands for patients with nerve and spinal injuries.

Orthocell snapshot

» Currently employs 30 people

» On the verge of local and international market approvals for its locally manufactured medical device for nerve repair

» Technology invented by Professor Minghao Zheng, The University of Western Australia

» $300k Laboratory Construction Grant received from the Western Australian Government in 2008 – integral to tech development and translation of research

Orthocell is at a similar stage to Avita Medical, founded by Western Australian Dr Fiona Wood, and PolyNovo, prior to them gaining major market approvals.

Image credit: Orthocell

2. Facilitating commercialisation

The Western Australian Government will reform its intellectual property, procurement and bio-prospecting frameworks to support the commercialisation of local innovations in the health and medical life sciences industry.

Management of intellectual property, government procurement and bio-prospecting are areas of particular complexity, which directly affect pathways to commercialisation for health and medical innovations.

Government can support innovative businesses to navigate these pathways. It can provide increased clarity, consistency and access across the public health system and associated regulation, developing accelerated pathways to commercialisation, and providing funding to engage and de-risk these pathways.

Government will focus on:

» improving the effectiveness of government policy and processes that affect commercialisation, including procurement and intellectual property

» improving sector-wide capacity and capability to commercialise ideas and build successful businesses.

3. Developing skills and attracting talent

The Western Australian Government will work actively with industry to expand the pool of locally-available skills and talent to progress innovations through to scale up and commercialisation.

Access to talent and skills is critical to enable growth and innovation in the health and medical life sciences industry. This is recognised in the State STEM (science, technology engineering

and mathematics) Strategy Future Jobs, Future Skills – Driving STEM Skills in Western Australia.

Through training schemes, promotional programs and direct incentives, government can help build a critical mass of talent and an environment where innovative thinking and entrepreneurship are valued, which will strengthen the ecosystem overall and enable Western Australian companies to compete for skills.

Government will focus on:

» enhancing and developing local skills, particularly entrepreneurial skills and commercial capacity

» improving the attraction and retention of new talent, including entrepreneurs and business executives.

4. Attracting investment

The Western Australian Government will promote Western Australia as a prime destination for investment in health and medical life sciences activities.

One of the key challenges in progressing through the commercialisation pipeline is securing investment beyond early-stage concept development and testing. Building on the state's strong comparative advantages, government can help promote Western Australia as a prime destination for investment and open up supply, trade and investment opportunities in local, national and international markets. Government funding can also be leveraged to attract private sector investment and venture capital.

Government will focus on:

» developing a coordinated approach to attract investment by promoting strengths and opportunities in Western Australia's emerging health and medical life sciences industry

» developing relationships with prospective local and international investors

» facilitating access to market information and international conferences

» leveraging Western Australian and Australian government funding to attract private sector investments.

5. Supporting infrastructure for advanced manufacturing

The Western Australian Government will support the development of testing and manufacturing facilities to enable the scale up and commercialisation of local health and medical life sciences innovations.

Western Australia is growing its infrastructure capability to progress innovations through to later-stage clinical trials and manufacturing. In particular, the medtech and pharmaceutical subsectors need access to wet lab incubators as well as accredited and sometimes purpose-built facilities for prototyping, testing and manufacturing their innovations at scale. Government can also incentivise and de-risk the development of such capability through procurement, funding, land provision, and collaboration with the Australian Government.

Government will focus on:

» supporting and enhancing local manufacturing to unblock the pipeline for research, development and testing of innovative products

» enhancing local manufacturing capabilities to ensure security of supply chains and sovereign capabilities.

WA CASE STUDY

Linear Clinical Research

As a world-class leader, Linear Clinical Research (Linear) is a purpose-built, state-of-the-art, clinical trials facility operating out of QEII Medical Centre in Perth, Western Australia.

Linear has come a long way since its inception in 2010 as a visionary collaborative venture between The Harry Perkins Institute of Medical Research and the Western Australian Government. The facility was established with $9.4 million funding from the government to provide the state's first early phase clinical trials facility and critical infrastructure for the state's local biotech, pharmaceutical and clinical research sectors.

Linear provides a focal point for Australian clinical and medical research, bringing world-first clinical trials to Western Australia and making innovative therapies available to the Western Australian community. They have now grown to more than 250 staff and have generated revenue in excess of $100 million per annum. Linear is Australia's most technology-forward trial facility and most active phase I cancer trials team.

Since 2010, Linear has achieved the following other notable milestones:

» Chosen to deliver five COVID-19 related trials, including a global COVID-19 Vaccine study, fully funded by the Coalition for Epidemic Preparedness Innovations (CEPI) and COVID-19 preventative study with Stanford University

» More than 50 actively recruiting oncology and haematology studies

» Recognised as a global leader in the use of eSource data capture

» Listed in the AFR's Most Innovative Companies list for Healthcare in 2020

» More than 300 studies across 19 therapeutic areas

» Sponsors from 15 countries

» More than 40,000 clinical trial participants on their database

» Winner of multiple industry export awards

» Globally experienced team hailing from more than 30 different nationalities.

Image credit: Linear

Implementation and stakeholder engagement

Contribution from all stakeholders is important to achieve the Government's vision for Western Australia's health and medical life sciences industry.

The Western Australian Government works closely with industry, research organisations and the Australian Government. An industry reference group, chaired by the Chief Scientist of Western Australia, has been established with key industry leaders to provide strategic advice and represent the overall views and interests of the industry. The reference group will remain in place throughout the implementation of the strategy. The Western Australian Government is well-connected with the MTPConnect Industry Growth Centre through its partnership in the MTPConnect WA Life Sciences Innovation Hub. It has also formed strong relationships with the national peak body for life sciences, AusBiotech, and will host the AusBiotech 2022 and Australia Biotech Invest and Partnering Conference in Perth in October 2022.

The Department of Jobs, Tourism, Science and Innovation, in collaboration with the Department of Health, will lead the implementation of the strategy by developing an implementation plan, in consultation with industry, which will include tangible actions giving effect to the strategy.

The strategy and the associated implementation plan will remain flexible to address changing market conditions and maintain alignment with other Western Australian Government priorities. Government will report regularly on progress in the delivery of the strategy and its implementation plan.

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The Western Australian Government acknowledges and thanks the many stakeholders who have contributed to the development of the Health and Medical Life Sciences Industry Strategy, including the Industry Reference Group for the Life Sciences Industry and the many innovators, researchers and thought leaders who have nurtured the industry to its current state.

For further information please email the Science and Innovation division at the Department of Jobs, Tourism, Science and Innovation on lifesciences@jtsi.wa.gov.au

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